

*Reports from the Environmental Archaeology Unit, York 96/49, 10pp. + 11pp.
Appendices*

**Vertebrate remains from excavations at the Glaxo-Wellcome factory
premises, Ware, Hertfordshire**

by

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Summary

Excavations at numerous sites in the vicinity of the Glaxo-Wellcome factory produced small assemblages of animal bone. Although most of the material is of limited interpretative value, several points are worthy of note.

The presence of burnt cattle mandibles complements evidence from the late Roman waterfront sites in Lincoln where a large proportion of cattle jaws had been deliberately scorched around the area of the diastema. These have been interpreted as waste from liquid marrow extraction.

Characteristic 'hook' damage and other butchery practises were noted on cattle scapulae from several of the Ware sites. These butchery techniques have also been recorded from other Roman sites in Britain and mainland Europe and are regarded as evidence for salting, smoking or drying shoulder joints.

The occurrence of butchery marks on a small number of horse bones suggests that horse meat may have been an occasional element of the diet. Alternatively these marks may represent activities associated with skinning and carcass dismemberment.

Keywords: GLAXO-WELLCOME FACTORY; WARE; HERTFORDSHIRE; ROMAN; VERTEBRATE REMAINS; BURNT MANDIBLES; BUTCHERED SCAPULAE

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5 November 1996

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Introduction

Between 1993 and 1996 the Hertfordshire Archaeological Trust (HAT) undertook a series of archaeological evaluations, excavations and watching briefs prior to a programme of redevelopment at the Glaxo-Wellcome factory premises, Ware. The area under development included the former ground of Ware Football Club and part of a neighbouring open area (The Buryfields). Over the last twenty years continual development at the Glaxo-Wellcome complex has provided pockets of information relating to Roman activity in the vicinity of Ermine Street. The objective of the extensive archaeological work undertaken during the most recent development (Glaxo Access project) was to contribute further information to the growing picture of the nature and development of the Roman *vici* and to identify future research priorities.

The vertebrate remains under consideration in this report were recovered from various evaluations and excavations of four different areas of archaeological interest (see Table 1).

Area 1 covers Ermine Street, Area 3 includes an area to the east of Ermine Street where evidence of occupation might be expected, and Areas 2 and 4 cover locations which might be expected to lie on or beyond the edge of the settlement.

As can be seen from the numbers presented in Table 1, vertebrate remains were far from numerous and, in the case of sites HAT 188 and HAT 180, were spread across a large area, from many different trenches.

Where information existed, either from the pottery spot dates, or from the archaeological text supplied by HAT, the material was divided into four chronological groups (1st-2nd century AD, 2nd-3rd century AD, 3rd-4th century AD, 4th-5th AD). Additionally a broad Roman category was used to include the material

from those deposits which could not be more tightly dated. However, in the archive descriptions (Appendix 1), contexts dated only as 'Roman' were placed with more tightly dated deposits where the features or fills were obviously associated.

Methods

All the bone was examined and records made regarding the state of preservation, colour, and the appearance of broken surfaces ('angularity'). Additionally, semi-quantitative information was also recorded (for all bones) concerning fragment size, dog gnawing, burning, butchery and fresh breaks.

Identification was carried out using the reference collection of the Environmental Archaeology Unit (EAU), University of York.

Detailed recording of the bones followed the diagnostic zones method described by Dobney and Rielly (1988). Evidence of butchery was noted where present, as was any pathology. Tooth eruption and occlusal wear for caprovid mandibles were recorded using the stages outlined by Payne (1973; 1987) and for cattle and pig mandibles those devised by Grant (1982); measurements (unless otherwise specified) followed von den Driesch (1976). A record of all measurements taken can be found in Appendix 2.

All fragments not identified to species were recorded as unidentified. These included all vertebrae, ribs, shaft fragments and specific skeletal elements where species was unclear. Some fragments, such as skull, maxillae and maxillary teeth are classified as 'non-diagnostic zones' and have been incorporated into the unidentifiable fraction. General notes were also made regarding any butchery or pathology.

The sites

Since most of the remains from these sites were of limited interpretative value, the following is a site-by-site summary of the more interesting points. More detailed information can be found in the archive reports (Appendix 1). Total fragment counts for each site can be found in Tables 2-8.

HAT 143 - Security gate evaluation

Material from this evaluation amounted to only 13 identified and 55 unidentified fragments from Contexts 100, 101, 109 (Trench 1) and 103 (Trench 3).

The small size of the assemblage renders the vertebrate material from this evaluation of little interpretative value.

HAT 156 - Security gate excavation

A small assemblage totalling 176 identifiable and 841 unidentifiable fragments, from thirty-nine contexts, was recovered during the excavations.

Preservation was mostly recorded as 'fair', with fragments from Context 218 being recorded as excellent. The bones, within each context, were either brown or fawn. Context 293 contained fragments coated with a greenish concretion, which was most apparent on the horse bones. Small amounts of butchery were noted, along with some dog gnawing and fresh breakage.

Although the animal bone assemblage from this site is limited in size, several points are worthy of note:

In total twelve cattle scapulae blade fragments were recovered from 1st-2nd century fills of the pond. All showed signs of having been systematically butchered in the same fashion (i.e. each had their glenoid portion removed).

A horse pelvis, a radius and a tibia from early to late Roman deposits all showed signs of butchery.

Cattle mandibles from both 1st-2nd and 2nd-3rd century deposits showed signs of scorching. The 1st-2nd century pond has been interpreted as a smelting pond, with layers of ash and burnt material being present and the evidence for burning on the mandibles might thus be a result of this industrial activity.

The numerous cattle mandible fragments from late 4th century Waterfront deposits in Lincoln showed similar signs of discreet burning in the region of the diastema, although some were more generally affected over the whole tooth row, ramus and teeth (Dobney *et al.* 1996). At Lincoln, there was no evidence of any industrial activity which could have caused the scorching, and none of the other skeletal elements were affected.

Dark earth deposits of supposed 4th-5th century date contained a human humerus fragment. Other animal remains from a bulk-sieved sample from the same deposit appeared 'battered' in appearance. This suggests that at least some components of the dark earth deposits are redeposited.

HAT 143 - Park Road evaluation

Only 18 identified and 26 unidentified fragments were recovered from six contexts, five of which were dated to the post-medieval period or were undated. The remaining context (220) was broadly dated to the Roman period. Little can be gleaned from this assemblage as there were insufficient fragments for any meaningful interpretation.

HAT 156 - Park Road excavation

Excavation uncovered part of a late Roman cemetery and not surprisingly animal bone was scarce. Twelve contexts produced only six identified and 29 unidentified bone fragments. This assemblage was, once again, too small to provide useful

zooarchaeological data.

HAT 143 - Buryfields tree planting excavation

Few archaeological remains were uncovered from the six small trenches excavated in this area. As only one identified and nine unidentified fragments were recovered from three contexts, the assemblage is of no interpretative value.

HAT 164 - Ware football club, Trench 8

The twelve bone-bearing contexts from this site produced 70 identified and 195 unidentified fragments.

Although this small assemblage is of little interpretative value, several points are worthy of note. From the upper fill of a quarry pit (dated to the 2nd-4th century), several cattle scapulae blades were recovered, one with the glenoid region removed (and thus similar to those recovered from HAT 156). In addition, several cattle horncores, showing signs of butchery, were also noted.

HAT 180 - Ware football club evaluation

Another small vertebrate assemblage was recovered from this evaluation. A total of 436 unidentified and 114 identified fragments were recovered from 24 contexts.

Overall, preservation of the bones was fair to good, some of fragments showing some root etching, and most fragments being fawn in colour and 'spikey' in appearance.

From deposits of broadly Roman date, two scapulae with obvious hook damage (one with the spinous process also removed) were recovered. Two further cattle scapulae, which had been butchered around the distal end, were recovered from a pit fill of general Roman date. In addition, a cattle horncore, which showed evidence of having been sawn through the

base, and a horse pelvis with chop marks were recorded. Of further interest were the comparatively high numbers of cervid fragments (11 out of 114 identifiable fragments) present in the assemblage. A roe deer metatarsal and red deer radius were recovered from a 3rd-4th century ditch fill, whilst a red deer metatarsal, a radius, and several 1st phalanges, and also a cervid metapodial, were identified from a 4th-5th century pit fill. General Roman deposits also produced red deer remains (a femur fragment, an incisor, a radius) and a possible red deer cranial fragment.

HAT 188 - Ware football club watching brief

Twelve contexts containing bone (from nine different trenches) produced only seven identified and 54 unidentified bone fragments. This small assemblage is of no interpretative value.

Conclusions

The vertebrate assemblages from the various excavations produced only small numbers of identifiable bones and measurable fragments, with few contexts yielding enough material for any detailed analysis. However, the remains did yield some limited zooarchaeological information consistent with data from other, larger Roman assemblages from Britain.

Although a range of elements was recovered from each of the sites, many (crania, mandibles, isolated teeth, metapodials and phalanges) were represented by fragments that are indicative of primary butchery waste. Although, there were no large dumps of horncores, several of those which were recorded showed deliberate removal from the skull. This suggests that hornworking, at least on a small scale, was undertaken in the vicinity. Similarly, the limited concentrations of metapodials and phalanges might represent tanning waste.

Mandibles with evidence of scorching were recovered from the Security gate excavation (HAT 156). As already stated above, this phenomenon has been recorded on mandibles from late 4th century deposits in Lincoln and has been interpreted as evidence for liquid marrow extraction, possibly for the production of lamp oil or cosmetics (Dobney *et al.* 1996).

Two pit fills from the Football club evaluation (HAT 180) produced a small number of cattle scapulae, two of which showed evidence of the characteristic damage caused by perforation of a butcher's hook through the blade. Additional butchery of cattle scapulae was noted from a number of the sites at Ware, including the trimming or complete removal of the glenoid cavity and removal of the spina. Similar damage was noted on scapulae from 1st and 4th century deposits in Lincoln (Dobney 1996) and from 1st and 2nd century deposits in York (O'Connor 1987; 1988). These scapulae possibly represent cured shoulder joints and have been noted from many other sites of Roman date, both in Britain and mainland Europe.

Butchered horse bones attest to the probable utilisation of horse flesh in Roman Ware. However, they may simply be evidence of the simple dismemberment of carcasses for disposal or for feeding to dogs.

The comparatively high numbers of cervid fragments (11 out of 114 identifiable fragments) present in the Football club evaluation assemblage (mostly from 3rd-4th and 4th-5th century deposits) are of some interest. Grant (1981) suggests that, at a number of Roman sites, the percentage of cervid remains increases in the 4th and 5th centuries. She postulates that this increase coincides with the withdrawal of the Roman army and the subsequent breakdown of established agricultural systems, forcing people to supplement their diet by hunting.

Archive

All material is currently stored in the Environmental Archaeology Unit, University of York, along with paper and electronic records pertaining to the work described here.

Acknowledgements

The authors are grateful to Hertfordshire Archaeological Trust and Bob Zeepvat for providing the archaeological information and to English Heritage for allowing KD to contribute to this work.

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Table 1. Numbers of bone fragments for each intervention.

Site code	Site name	Area	Scale of work	Number of fragments
HAT 143	Access Project Phase 1, Security Gate	1	Evaluation	68
HAT 156	Access Project Phase 1, Security Gate	1	Excavation	1017
HAT 143	Access Project Phase 2, Park Road diversion	2	Evaluation	44
HAT 156	Access Project Phase 2, Park Road diversion	2	Excavation	35
HAT 143	Phase 3, Buryfields	4	Excavation	10
HAT 164	Football Club, Trench WFC8	3	Excavation	265
HAT 180	Football Club	3	Evaluation	550
HAT 188	Football Club (car park footings)	3	Watching brief	61

Table 2 . Total number of fragments from HAT 143 - Security gate evaluation.

Species		Roman
<i>Equus f. domestic</i>	horse	1
<i>Sus f. domestic</i>	pig	3
<i>Bos f. domestic</i>	cow	7
Caprovid	sheep/goat	2
<i>Sub-total</i>		13
Unidentified		55
Total		68

Table 3. Total number of fragments from HAT 156 - Security gate excavation.

Species		1st-2nd	2nd-3rd	3rd-4th	4th-5th	Roman
Arvicolinae/murinae	vole/mouse	1	2	0	1	0
Arvicolinae	vole	0	1	0	0	0
<i>Rattus rattus</i> (L.)	rat	0	0	0	1	0
<i>Canis f. domestic</i>	dog	1	4	0	0	0
<i>Equus f. domestic</i>	horse	8	10	1	1	0
<i>Sus f. domestic</i>	pig	10	8	1	4	0
<i>Capreolus capreolus</i> (L.)	roe deer	0	0	0	1	0

Species		1st-2nd	2nd-3rd	3rd-4th	4th-5th	Roman
<i>Bos f. domestic</i>	cow	24	22	0	9	0
Caprovid	sheep/goat	17	17	2	11	0
<i>Ovis f. domestic</i>	sheep	0	2	0	3	0
cf. <i>Capra f. domestic</i>	?goat	1	0	0	0	0
<i>Anser sp.</i>	goose	0	0	0	0	1
cf. <i>Gallus f. domestic</i>	?chicken	1	1	0	2	0
<i>Gallus f. domestic</i>	chicken	0	1	0	0	0
<i>Corvus corone L.</i>	crow	1	0	0	0	0
Amphibia indet.	amphibian	0	0	0	1	0
Pisces indet.	fish	0	3	0	1	0
<i>Homo sapiens L.</i>	human	0	0	0	1	0
<i>Sub-total</i>		64	71	4	36	1
Unidentified		247	406	22	166	0
Total		311	477	26	202	1

Table 4. Total number of fragments from HAT 143 - Park Road evaluation.

Species		Roman	Undated
<i>Canis f. domestic</i>	dog	10	0
<i>Equus f. domestic</i>	horse	2	2
<i>Bos f. domestic</i>	cow	4	1
Caprovid	sheep/goat	0	1
<i>Sub-total</i>		16	2
Unidentified		20	6
Total		36	8

Table 5. Total number of fragments from HAT 156 - Park Road excavation.

Species		3rd-4th	Roman
<i>Equus f. domestic</i>	horse	2	2
<i>Sus f. domestic</i>	pig	0	1
Caprovid	sheep/goat	0	1
<i>Sub-total</i>		2	4
Unidentified		5	24
Total		7	28

Table 6. Total number of fragments from HAT 164 - Ware Football club, Trench 8.

Species		1st-2nd	2nd-3rd	Roman
<i>Lepus</i> sp.	hare	1	0	0
<i>Canis</i> f. domestic	dog	0	0	4
<i>Equus</i> f. domestic	horse	0	0	3
<i>Sus</i> f. domestic	pig	1	1	5
<i>Cervus elaphus</i> L.	red deer	0	0	1
<i>Bos</i> f. domestic	cow	3	3	27
Caprovid	sheep/goat	7	0	8
<i>Ovis</i> f. domestic	sheep	0	0	1
<i>Cygnus</i> sp.	swan	1	0	0
<i>Anas</i> cf. <i>platyrhynchos</i>	?Mallard	0	0	1
cf. <i>Gallus</i> f. domestic	?chicken	0	0	1
<i>Gallus</i> f. domestic	chicken	0	0	2
<i>Sub-total</i>		13	4	53
Unidentified		40	7	148
Total		53	11	201

Table 7. Total number of fragments from HAT 180 - Ware Football club evaluation.

Species		1st-2nd	3rd-4th	4th-5th	Roman
Canid	dog/fox	0	6	0	0
<i>Canis</i> f. domestic	dog	0	6	0	0
<i>Equus</i> f. domestic	horse	0	6	2	4
cf. <i>Cervus elaphus</i> L.	?red deer	0	1	0	1
<i>Cervus elaphus</i> L.	red deer	0	1	4	3
<i>Capreolus capreolus</i> (L.)	roe deer	0	1	0	0
<i>Bos</i> f. domestic	cow	1	27	6	21
Caprovid	sheep/goat	0	13	4	4
<i>Gallus</i> f. domestic	chicken	0	0	0	2
<i>Homo sapiens</i> L.	human	0	0	0	1
<i>Sub-total</i>		1	61	16	36
Unidentified		19	204	53	148
Total		20	265	69	184

Table 8. Total number of fragments from HAT 188 - Ware Football club watching brief.

Species		Roman
<i>Equus f. domestic</i>	horse	1
<i>Sus f. domestic</i>	pig	1
<i>Cervus elaphus L.</i>	red deer	1
<i>Bos f. domestic</i>	cow	3
Caprovid	sheep/goat	1
<i>Sub-total</i>		7
Unidentified		54
Total		61

Appendix 1

The following is a detailed archive summarising the material from individual sites and contexts.

HAT 143 - Security gate evaluation

Roman

Context 100 - fill of feature 104

Produced one caprovid radius and a single sheep-sized rib fragment.

Context 101 - fill of shallow pit 102

One caprovid radius fragment and 17 unidentified fragments, mostly sheep-sized shaft and rib were recovered.

Context 103 - substantial archaeological horizon

Seven cattle, 3 pig fragments and 33 unidentified fragments, mostly cs shaft fragments (from split bones) were recovered.

Context 109 - fill of ditch 110

This deposit produced a horse humerus and 4 unidentified fragments, mostly cs ribs.

The material from all these deposits is of little interpretative value.

HAT 156 - Security gate excavation

1st-2nd century

Context 206 - build-up layer

One cow-sized shaft fragment was recovered.

Context 210 - fill of posthole 209

A single cow-sized pelvis fragment was recovered.

Context 223 - fill of pit 222

Two sheep-sized shaft fragments were recovered.

Context 225 - fill of pit 224

Context 234 - fill of pit 224

These two deposits produced two horse fragments, which were a femur and lateral metapodial fragment and a single caprovid scapula.

Context 227 - dark loam backfill of a linear slot 226

This deposit produced 5 identifiable and 12 unidentifiable fragments. The unidentifiable

fraction consisted mainly of sheep-sized rib and sheep and cow-sized shaft fragments, whilst the identifiable material included the remains of horse, sheep and pig. This small group of fragments was of little interpretative value.

Context 245 - a thin spread of loam close to the eastern side of the road

Two fragments were recovered from this deposit, one being a cattle astragalus, the other a cow-sized scapula blade fragment.

Context 246 - fill of a roadside ditch 255

Dog, pig and cattle fragments were recovered, along with cow-sized mandible fragments.

Context 251 - fill of a roadside ditch 250

Three cow-sized shaft fragments, and four fragments representing cattle, caprovid and pig remains were recovered.

Context 272 - fill of posthole 271

Produced six unidentified fragments, most of which were cow-sized shafts.

Context 277 - posthole fill - part of structure ?associated with a possible 'smelting' pond

One cattle mandible and 3 sheep-sized shaft fragments were recovered.

Feature 285 was a pond to the east of Ermine Street. Seven fills were identified, including layers of natural silting, probably representing periods of bad weather when large quantities of material were washed in. In addition, there were layers of debris in the basal and upper levels reflecting the slow accumulation of material. These probably represent dumps of unwanted refuse associated with activities around pond. It is likely that the feature was once a smelting pond. The presence of ash and burnt material within the layers was also noted.

Context 280 - upper fill of pond 285

Context 281 - fill of pond - layer of gravel and demolition rubble suggesting the collapse of a structure - dated as Roman

Context 283 - upper fill of pond 285

Context 290 - dump in the pond

Context 293 - primary fill of pond 285

The fragments from these deposits totalled 33 (3 frags from sample 14, Context 280) identifiable and 135 (26 frags from sample 14, Context 280) unidentifiable fragments. Most of the bones were the remains of cattle, followed by caprovid, horse

and pig. The unidentifiable fraction from the upper fills (280 and 283) consisted mainly of sheep-sized shaft and rib fragments, whilst the primary deposit produced mostly cow-sized rib, shaft and vertebrae fragments.

Those elements which were recorded included mandibles, maxillae, isolated teeth, scapulae (in the unidentified fraction 11 cow-sized scapulae blade fragments, with their glenoid region removed), metapodials (additional caprovid metapodial shaft fragments were recorded under the 'unidentified' category), phalanges and radii.

Context 293 contained a cattle mandible which appeared scorched, the teeth shattered by heat. A single horse pelvis had possibly been chopped around the acetabulum. Context 280, sample 14 also included a small mammal femur.

The vertebrate remains from these deposits appeared to be mostly primary butchery waste.

2nd-3rd century

Context 201 - layer

Only three shaft fragments were recovered.

Context 202 - dump - the bulk of the pottery was of 2nd to 3rd century date

This deposit produced 38 identifiable and 80 unidentifiable fragments. Horse, cattle, caprovid and pig were present and many of the fragments showed extensive butchery. The unidentifiable fraction was composed mainly of cow-sized shaft and rib fragments; also present were 3 sheep-sized metapodial and 2 tibia shafts.

Mandibles and metapodials were the most numerous element present, but a range of elements was noted. Most of the fragments again represented primary butchery waste.

Context 203 - layer

This deposit contained 15 unidentified fragments, mainly cow and sheep-sized shaft and rib fragments.

Context 205 - fill of posthole 204 - possibly contemporary with well 220/284

A single microtine incisor, one fish fragment, two cow-sized rib fragments and 224 unidentified fragments were recovered from Sample 10.

Pit 207 contained five separate fills, including dumps of burnt material material (218-219) and was sealed by a thick levelling deposit (208).

Context 208 - levelling deposit of pit 207

This deposit contained only a single cow-sized shaft fragment.

Context 218 - dumps of burnt material in pit 207

Context 219 - dumps of burnt material in pit 207

A small assemblage was recovered from these two deposits and comprised 16 identifiable (5 fragments from Context 219, Sample 12) and 47 unidentifiable (25 fragments from Context 219, Sample 12) fragments. These included the remains of cattle, sheep, dog and possible chicken. Additionally there were two unidentified fish fragments and two vole/mouse bones from Context 219 (Sample 12). The unidentified fraction was composed of cow and sheep-sized rib and vertebrae fragments. Also of interest was a dog radius showing evidence of possible rickets from Context 219.

Context 229 - primary fill of pit 207 - Contained a single dog ulna, horse femur shaft fragment and cow-sized shaft and rib.

Context 212 - fill of posthole 211

This deposit produced 2 sheep-sized shaft fragments and 23 small and fragmented bones from Sample 11.

The most substantial feature from this period was a large well which comprised two elements: a large pit (220) and a shaft (284).

The construction pit of the well had been backfilled by four deposits: 221, 248, 249 and 279.

Context 221 - uppermost gravelly fill of well pit

Context 248 - fill of well pit

Context 249 - fill of well pit

The ten identifiable fragments from these three contexts represented horse, cattle, caprovid and pig remains. Elements present included mandibles, metapodials (3 sheep-sized metatarsal shaft fragments were also noted from the unidentified fraction), phalanges and a single cattle horncore. The unidentified material consisted of sheep-sized shaft and cow-sized rib and vertebrae fragments.

The horncore showed evidence for having been removed from the cranium, with chop marks noted

around the base. A horse radius from Context 221 had a chop on the shaft and knife marks on the proximal articulation. Additionally, a caprovid mandible from Context 249 had been scorched.

Seven fills were excavated from the well shaft - 235-37, 242, 244, 247, 289.

Context 236 - fill of well shaft

Context 237 - fill of well shaft

Context 242 - fill of well shaft

Context 247 - lower fill of well shaft - substantial back fill layer

Context 289 - lower fill of well shaft - substantial back fill layer

A total of 16 identified and 48 unidentified fragments were recovered from these contexts. Cattle bones were the most numerous (13), with single fragments of caprovid, horse and crow. The unidentified fraction consisted of cow-sized cranial, rib and shaft fragments, including a scapula blade with the glenoid removed. Context 242 contained mandible fragments with evidence of scorching. Many of the identifiable fragments showed evidence of butchery. A cattle horncore from Context 289 had been chopped around the base and across associated cranium.

3rd-4th century

The main evidence for occupation during this period was a series of substantial postholes. Large in size, these post-pits possibly held the posts of a substantial timber building.

Context 258 - fill of posthole 257

This deposit produced one caprovid metatarsal and seven cow and sheep-sized rib and shaft fragments.

Context 263 - fill of posthole 262

This deposit contained 3 cow-sized shaft fragments.

Context 265 - fill of posthole 264

Single mandibles of pig and caprovid, and seven cow and sheep-sized rib fragments were recovered.

Context 275 - fill of posthole 274

This deposit contained 1 horse incisor, and five unidentified bones including cow-sized scapulae.

4th-5th century

Context 200 - Late Roman dark earth layer, formed by a slow build up of debris representing a period of possible 'decay' and the eventual abandonment of the settlement. This layer was located elsewhere during previous excavations, and it sealed earlier Roman horizons and encroached over the top of Ermine Street.

There were 36 identifiable fragments representing the remains of horse, pig, cattle and caprovid. Cattle and caprovid elements were mainly mandibles, isolated teeth, metatarsals and phalanges. Also identified was a single roe deer metatarsal and two possible chicken bones. A sample from this deposit produced single fragments of amphibian, vole/mouse, rat, and fish. A human humerus fragment was also recovered.

The unidentifiable fraction amounted to 165 fragments (85 fragments from Sample 8). The fragments from the sample were very small and rather battered in appearance. The remainder included many cow-sized rib, scapulae and shaft fragments and five sheep-sized metapodial shaft fragments. Few bones showed evidence of butchery, with the exception of a horse tibia which had been chopped across the shaft.

Most of the vertebrate remains were representative of primary butchery waste.

Roman

Context 267 - road surface. Contained a single goose tarsometatarsus

HAT143 - Park Road evaluation

Five of the six deposits containing bone were dated to the post-medieval period. The sixth context was broadly dated to the Roman period.

Context 220 - fill of large pit 219 - ?probable rubbish pit

This deposit contained 16 identifiable (four cattle, two horse and ten dog) fragments were recorded. The dog remains (mandibles, isolated teeth, axis, atlas and radius) probably represent the same individual. The 20 unidentified fragments were mostly cow-sized shaft and cranial fragments, but also included two dog vertebrae.

HAT156 - Park Road excavation

3rd-4th century

Context 108 - fill of ditch 107, ?ditch defining edge of cemetery

Produced three unidentified fragments, a cow-sized mandible fragment, a cow maxillary molar and a caprovid maxillary premolar.

Context 127 - skeleton in grave

Produced a single horse lateral metapodial

Context 138 - fill of ditch 137

Produced one cow-sized shaft fragment

Context 140 - fill of large pit 139 - pre-dating cemetery

Produced one horse calcaneum and a single unidentified fragment.

Roman

Context 110 - fill of ditch 109, ? inner ditch defining edge of cemetery - related to Context108?

Produced a single horse incisor and one lateral metapodial.

Context 122 - fill of pit 121- post dating cemetery

Produced three cow-sized shaft fragments.

Context 132 - fill of grave 131

Two unidentified fragments were recovered.

Context 134 - fill of grave 133

Produced a single caprovid radius fragment.

Context 144 - fill of pit 143, one of a row of four

Produced one pig maxilla plus teeth, one cow-sized mandible fragment and a single sheep-sized rib fragment.

Context 147 - fill of grave 146

Seven unidentified fragments were recovered.

Context 153 - skeleton in grave

Produced one cow-sized metapodial fragment which was possibly worked and definitely split. Possibly a blank from bone working.

Context 164

Seven unidentified fragments were recorded.

HAT 143 - Buryfields tree planting excavation

Three contexts produced bone, one (301) of which was dated as modern and another (319) contained modern artefacts. The remaining context, 303, was the fill of a ?ditch, possibly serving as a boundary.

Context 303 - Roman date

This deposit produced a single caprovid mandible and seven unidentified fragments.

HAT 164 - Ware football club, Trench 8

The Roman archaeology has been interpreted as the remains of backplots to houses and workshops which fronted onto the eastern side of Ermine Street.

1st-2nd century

Group of small pits:

Context 105 - fill of pit 104 - later 1st-2nd century

Context 107 - fill of pit 106 - later 1st-2nd century

Context 114 - fill of pit 113 - later 1st-2nd century

105 - Eight unidentified fragments, including cow-sized rib and mandible fragments.

107 - Produced one cattle horncore.

114 - Three identified and 10 unidentified fragments (mostly cow-sized ribs) were recorded. Identified remains included two caprovid fragments and a swan radius fragment.

Context 122 - fill of pit 121 - part of structure - later 1st-2nd century

Context 129 - fill of pit 128 - part of structure - later 1st-2nd century

Context 137 - fill of pit 136 - part of structure - later 1st-2nd century

122 - Seven identified and 15 unidentified fragments representing the remains of cattle, caprovid, pig and hare were recovered. Cow-sized scapulae and rib fragments are the main components of the unidentifiable fraction.

129 - Three unidentifiable fragments, including a caprovid metapodial shaft fragment, were present.

137 - Three unidentifiable fragments were recovered.

Context 160 - fill of pit 159

One unidentifiable fragment was recovered.

2nd-3rd century

Two gullies, tentatively identified as property boundaries:

Context 103 - fill of gully 102

Context 118 - fill of gully 117

103 - This deposit produced seven unidentified and three identified fragments, including cow-sized and sheep-sized shaft fragments.

118 - Produced a single cattle metatarsal.

Roman

Context 108 - upper fill of quarry pit 110

Context 123 - primary fill of quarry pit 110

108 - 47 identified and 127 unidentified fragments were recovered from this deposit. The species present included cattle (25), horse (2), caprovid (8), pig (3), chicken (3) and duck (1). Additionally, a single red deer antler fragment was retrieved, and 4 dog bones. A range of elements were recorded. Evidence of butchery was extensive and included a cattle scapula with the glenoid region removed and two cattle horncores which had chop marks around the base of the core, showing their deliberate removal from the skull.

123 - Produced six identified and 13 unidentified fragments. Identified fragments include the remains of horse, cattle, caprovid and pig. Four out of the six fragments were metapodials, whilst the remaining two frags include a cattle horncore (similarly chopped to those from Context 108) and a caprovid mandible. The unidentifiable fragments were mainly cow-sized shaft and cow-sized and sheep-sized ribs.

Context 176 - upper fill of pit 177 - deliberate backfilled deposit

Produced eight unidentifiable fragments, including cow-sized shaft, rib and vertebrae fragments.

HAT 180 - Football pitch evaluation

Most of features from this site were pits and ditches which contained material of a domestic nature, typical of activities associated with backplots of dwellings and workshop buildings.

1st-2nd century

Feature 121 was a pit containing 4 separate fills.

Context 122 - uppermost fill of pit 121

Context 148 - fill of pit 121

122 - Produced one cattle scapula, 16 unidentifiable fragments (including a cow-sized scapula and metapodial shaft fragments).

148 - Two unidentified fragments were recorded.

Context 179 - fill of natural feature 178

Produced only one unidentified fragment.

3rd-4th century

Context 107 - fill of ditch 106

This deposit produced five identifiable and 28 unidentifiable fragments. The identifiable fragments included the remains of horse, caprovid and dog, whilst the unidentifiable fraction was made up of cow-sized ribs and horse femur fragments.

Context 113 - fill of ditch 112

Produced 13 identifiable and 32 unidentifiable fragments, mostly cow-sized vertebrae, mandible and ribs. The identifiable bones included a roe deer metatarsal and a red deer radius, along with three dog mandibles (plus isolated teeth), a horse mandible, a caprovid scapula and two isolated teeth, as well as two cattle fragments (a carpal and a radius fragment).

Context 118 - fill of pit 117

39 identifiable and 94 unidentifiable fragments were recorded. Cow was represented by 23 fragments, caprovid by seven, horse by two, canid by six and red deer by a single bone. Unidentified fragments were mostly cow-sized ribs and vertebrae, but also included some cow-sized and sheep-sized shaft fragments. A single cattle horncore which had been sawn across base was also noted. Part of the skeleton of a dog was also present.

Most of the cattle elements were phalanges, metapodials, isolated teeth, but also included several horncores, astragalus, calcaneum, carpal and cuboid fragments. Caprovid was represented by isolated teeth, as well as mandible and maxilla fragments. This assemblage is mostly made up of primary butchery waste.

Context 124 - secondary fill of ditch 123

Context 145 - primary fill of ditch 123

124 - A single cattle P4 and 11 unidentified fragments (mostly cow-sized scapula and rib fragments), as well as two sheep-sized metapodial fragments were recovered.

145 - Single elements of cow, horse and caprovid, as well as 11 unidentified fragments, including cow-sized vertebrae and cranial fragments

Context 140 - fill of pit 139 - ?large posthole

Three unidentified fragments were recovered.

4th-5th century

Context 105 - fill of grave cut 104

Produced one horse carpal/tarsal, a single horse humerus and 22 fragments, mostly unidentifiable but including a human phalanx, other human bone fragments and several horse sacrum fragments.

Context 108 - skeleton in grave 104

1 cow ulna was recovered.

Context 142 - fill (dump of dark clay with charcoal flecks) of small circular pit 141

This deposit produced 13 identified fragments, which included cattle metacarpal and four phalanges, a red deer metatarsal, radius and two first phalanges, as well as as caprovid mandible and an isolated dP4, an M3 and a first phalanx). The unidentified fraction totalled 31 fragments and included sheep-sized and cow-sized shaft fragments and a cervid metapodial shaft fragment.

Roman

Context 111 - fill of small circular pit 110

The four identified fragments were a red deer femur and incisor, a ?red deer cranial fragment and a caprovid radius. 29 unidentified fragments (mostly cow-sized and sheep-sized shaft fragments) were also recovered.

Context 120 - fill of pit 119 which appears to have silted naturally

Several identified fragments were present, representing cattle and chicken, as well as three unidentified fragments.

Context 136 - fill of ditch 135 which was deliberately backfilled

Produced one unidentified fragment.

Feature 137 was a substantial ditch with three fills (the primary one of which contained no bone).

Context 138 - uppermost fill of ditch 137

Context 157 - middle fill of ditch 137

138 - Produced 10 identified fragments representing cattle (6), caprovid (2) and horse (2). A range of elements were present and included scapula, tibia, humerus, radius, pelvis and metatarsal. The unidentified fraction totalled 70 fragments which were mostly cow-sized rib and vertebrae. The two cattle scapulae had been chopped around and on the glenoid region.

157 - 31 unidentified fragments, mostly cow-sized ribs and vertebrae. Four identifiable fragments, included a cattle phalanx and tibia, horse ulna and single red deer radius.

Context 153 - fill of large irregularly shaped pit 154

Produced five identified fragments representing cow (4) and horse (1), as well as three unidentified fragments.

Cattle was represented by two mandible fragments, a horncore and scapula, and horse by a single pelvis fragment. The cattle scapula showed characteristic hook damage to the blade and most of spinous process had also been removed. The horse pelvis also exhibited possible knife marks.

Context 159 - fill of pit 158

Produced two unidentified fragments.

The large pit (161) probably represents a rubbish pit associated with the structures along Ermine Street.

Context 162 - secondary fill of pit 161

Context 165 - primary fill of pit 161, represents a phase of dumping

162 - Produced several cattle fragments (a crania and heavily chopped mandible) and a domestic fowl bone.

165 - Produced a single cattle horncore and a caprovid metatarsal, as well as three unidentified fragments.

Context 169 - upper fill of pit 168, deliberate backfilling

Context 180 - primary fill of pit 168, the result of natural weathering

169 - Produced three cattle fragments, (including a scapula with possible hook damage), one human

humerus and six unidentified fragments.

180 - Produced two cattle mandibles.

Not dated but probably Roman.

Context 130 - fill of posthole 129 - not dated
Produced 12 unidentified fragments, mostly cow-sized shaft fragments.

HAT 188 - Football Club watching brief

The trenches monitored during this excavation were too small to reveal complete building plans or to expose large enough areas to accurately interpret the surviving archaeological remains.

Four separate areas of archaeological activity were identified (dated mainly from the Roman period) and contained pottery dateable to the later 1st or 2nd centuries.

Two large ?rubbish pits indicated an area of domestic activity to the rear of buildings along Ermine Street.

Context 102 - large pit

Context 103 - large pit

102 - Produced one cow-sized shaft fragment.

103 - Produced two unidentified fragments including a sheep-sized radius fragment.

Context 104 - corner of a pit or ditch
Produced one caprovid metatarsal shaft fragment.

Context 105 - sub-circular pit
Produced three sheep-sized shaft fragments.

Two parallel ditches

Context 107 - ditch

Context 108 - ditch

107 - Produced three unidentified fragments.

108 - Produced a cattle scapula fragment and maxillary molar, as well as 19 unidentified fragments (mainly cow-sized scapulae and ribs).

Context 110 - linear ditch - ?boundary ditch
A red deer radius and ulna, and several cow-sized horncore fragments and one vertebra were recovered.

Context 111 - North-West corner of a substantial ditch - function uncertain but may have been a quarry pit

Produced 14 unidentified fragments, being mostly cow-sized shaft and scapulae fragments.

Context 112 - cut and fill of ditch
Produced one horse femur shaft fragment.

Context 113 - linear ditch
Produced a single cow-sized cranium fragment.

Context 114 - ? ditch
Produced a single ?domestic fowl sternum fragment.

Context 119 - Sn edge of large pit
Produced single fragments of horse, cow, caprovid and pig and five cow-sized rib and shaft fragments.

Appendix 2

Measurements following those outlined by von den Dreisch (1976) and Davis (1992).

Cattle measurements

Horncore							
Date	Site	Context	Id no.	41	42	43	BC
1st-2nd	HAT 156	249	189	49.1	30.6	141	135
1st-2nd	HAT 164	107	467	56.5	35.5		147
2nd-3rd	HAT 156	289	255	75.5	50		202
3rd-4th	HAT 180	118	319	45.6	33.9		129
3rd-4th	HAT 180	118	320	66.5	44.6		180
Roman	HAT 180	153	356	83.6	58.8		230
Roman	HAT 180	165	383	68.8	48.1		199
Roman	HAT 164	108	412	78.7	58.9		221
Roman	HAT 164	108	413	42.3	33.6		133
Roman	HAT 164	123	461	42.9	35.2	145	134

Scapula					
Date	Site	Context	Id no.	GLP	SLC
1st-2nd	HAT 156	293	159	68.4	53.9
Roman	HAT 180	153	353	64.7	48.6
Roman	HAT 180	169	359	56.7	42.5
Roman	HAT 180	138	372	68.2	54.2

Radius									
Date	Site	Context	Id no.	Bp	BFp	Bd	BFd	GL	SD
3rd-4th	HAT 180	113	394	74.2	69.2	66.1	61.5	275.8	37.7
Roman	HAT 156	202	202	73.1	68				
Roman	HAT 164	108	427	77.9	71.2				

Tibia						
Date	Site	Context	Id no.	Bd	Dd	SD
Roman	HAT 180	157	349	69.1	48.6	27
Roman	HAT 180	138	375	72.8	50.9	28.6
Roman	HAT 164	108	430	63.4	46.5	
Roman	HAT 143	220	485	57.3	43	

Astragalus						
Date	Site	Context	Id no.	Bd	DI	GLI
3rd-4th	HAT 180	118	311	44.5	38.2	67.5
Roman	HAT 180	169	361	40.1	33.2	60.6

Calcaneum					
Date	Site	Context	Id no.	C	DS
3rd-4th	HAT 180	118	312	25.5	34.7

Metacarpal										
Date	Site	Context	Id no.	Bp	Dp	Bd	Dd	Dem	Dvm	GL
1st-2nd	HAT 156	280	171	58.4			37.1			
2nd-3rd	HAT 156	218	267			55.5	28.7	23	29.1	
3rd-4th	HAT 180	118	307	65.2	36.8	64	33.4	26.2	33.5	193.8
Roman	HAT 156	202	204			56	30.8			

Metatarsal										
Date	Site	Context	Id no.	Bd	Dd	Dem	Dvm	GL	SD	DD
2nd-3rd	HAT 156	242	180	60.9	35.2	27	35.4			
3rd-4th	HAT 180	145	403	50.5	29.5	21.4	29.6	217.3	26	23.4
4th-5th	HAT 156	200	133	48	29.4					
4th-5th	HAT 156	200	134	50.1	29.5					
Roman	HAT 156	202	205	49.7	28.6	21.9	28.3			
Roman	HAT 188	119	409	65.9	36.3	29.6	36.5			
Roman	HAT 143	103	503	53.7						
Roman	HAT 143	103	504	52.5	30.1	23.8	30.5			

Caprovid measurements

Scapula					
Date	Site	Context	Id no.	GLP	SLC
1st-2nd	HAT 156	225	278	27.7	15.7

Radius						
Date	Site	Context	Id no.	Bp	BFp	SD
Roman	HAT 156	202	217	25.9	24.4	
Roman	HAT 180	111	401	28.5	25.3	16.6

Tibia						
Date	Site	Context	Id no.	Bd	Dd	SD
1st-2nd	HAT 156	251	258	23.9	17.8	
4th-5th	HAT 156	200	147	22.7	19.1	
Roman	HAT 156	202	219	22.1	17.1	9.4
Roman	HAT 156	202	220	23.2	17.5	10.8
Roman	HAT 164	108	438	25.7	18	12.6

Metacarpal						
Date	Site	Context	Id no.	Bp	Dp	SD
2nd-3rd	HAT 156	219	249	21.2	15.5	12.8
3rd-4th	HAT 156	258	290	23	16.1	14

Pig measurements

Scapula					
Date	Site	Context	Id no.	GLP	SLC
1st-2nd	HAT 156	251	257	42.7	27
Roman	HAT 143	103	498		21

Humerus						
Date	Site	Context	Id no.	BT	HT	HTC
Roman	HAT 156	202	209	34.1	30	20.8

Calcaneum					
Date	Site	Context	Id no.	C	DS
4th-5th	HAT 156	200	151	13.4	22.9

Metacarpal 3 and metacarpal 4							
Date	Site	Context	Id no.	Bp	Bd	GL	
Roman	HAT 164	123	464	22.1	21.7	98.9	MC3
1st-2nd	HAT 156	280	178	17.7	16	71.9	MC3
1st-2nd	HAT 156	280	179	16.1	15.5	74.2	MC4

Phalanx							
Date	Site	Context	Id no.	Bd	Bp	GLpe	SD
2nd-3rd	HAT 164	103	458	17	18.6	39.9	15.3

Horse measurements

Humerus										
Date	Site	Context	Id no.	Bd	BT	HT	HTC	GLC	GLI	SD
1st-2nd	HAT 156	293	157	71.4				246.7		34.7
3rd-4th	HAT 180	118	304	74.9	66.6	46.1	33.1	245.3	264	31.7
Roman	HAT 143	109	481	71.4	68.7	49.5	34.2			30.7

Scapula					
Date	Site	Context	Id no.	GLP	SLC
1st-2nd	HAT 156	280	165	78.8	55.9

Radius										
Date	Site	Context	Id no.	Bp	BFp	Bd	BFd	GL	SD	LI
2nd-3rd	HAT 156	221	246			61.4	53.7			
Roman	HAT 180	138	369	74.6	67.6	69.6	58.2	307.5	32.6	291.1

Tibia								
Date	Site	Context	Id no.	Bd	Dd	SD	GL	LI
1st-2nd	HAT 156	293	158	59.8	35.3			
3rd-4th	HAT 180	145	402	65.9	40.9	36.5	323	289
4th-5th	HAT 156	200	127	66.5	40.4			
Roman	HAT 180	138	370	75.9	47.4	39.9		
Roman	HAT 143	220	482	65.3	40.1	26.7		

Metacarpal						
Date	Site	Context	Id no.	Bd	DD	Dd
2nd-3rd	HAT 156	236	245	45	19	31

Metatarsal								
Date	Site	Context	Id no.	Bd	Bp	GL	GLI	LI
Roman	HAT 164	123	463	46	44.8	260.4	258.1	255.5

Femur				
Date	Site	Context	Id no.	Bd
1st-2nd	HAT 156	234	261	82.9

Red deer measurements

Radius							
Date	Site	Context	Id no.	Bd	BFd	GL	SD
4th-5th	HAT 180	142	336	53.6	48.2		
Roman	HAT 188	110	405			259.9	30.6

Chicken measurements

Radius						
Date	Site	Context	Id no.	Bd	GL	SC
4th-5th	HAT 156	200	156	5.9	55	2.6

Ulna								
Date	Site	Context	Id no.	Bp	Dip	Did	SC	GL
4th-5th	HAT 156	200	155	7.2	11.4	8.4	3.8	61.3
Roman	HAT 164	108	443	8.9	12.9			

Femur										
Date	Site	Context	Id no.	Bd	Dd	Bp	Dp	SC	GL	Lm
Roman	HAT 180	120	364	12.3	10.6	12.1	9.3	5.7	67.5	63.7
Roman	HAT 164	108	444			14	9.3	6.1		